northern Nev. on the 7th; to west-central Nev. on the 2d; and to Centreville, Alameda Co., Cal., on the 2d. A comparison of the southern limit of frost for September, 1890, with that of the preceding month shows that it occurred about 1° farther south in the Atlantic coast states, 4° to 5° farther south in the central valleys, about 10° farther south on the southeast slope of the Rocky Mountains, about 5° farther south in the plateau region, and about 4° farther south on the Pacific coast.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for September, 1890, as determined from the reports of nearly 2,000 stations, is exhibited on chart III. In the table of Signal Service data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The greatest monthly precipitation reported was 21.15 at Homeland, central Fla.; 19.55 was reported at Diamond, extreme north-central Ga., and more than 10.00 in northeast Ala., northeast Miss., south-central Tex., central and north-central Ark., north-central La., southwest Mo., west-central Ohio, south-central western N. Y., central and south-central Mass., and southern S. C. At Juneau, Alaska, the monthly precipitation was 17.11. At scattered stations in the Pacific coast states, the middle plateau region, and on the middle-eastern slope of the Rocky Mountains no precipitation was reported, and over the Rocky Mountain and plateau regions and along the Pacific coast, save on the northeast slope of the Rocky Mountains, and from northeast Cal. southeastward to eastern Ariz. and western N. Mex., the precipitation was less than 1.00. The precipitation was also less than 1.00 in areas in central and northeast Ill., the greater part of western Nebr. and southern S. Dak., southeast Wis., east-central lower Mich., and southeast Tex.

The precipitation was in excess of the average for September from the southeast slope of the Rocky Mountains eastward to the south Atlantic coast states and thence northeastward over the middle Atlantic states and New England to the Gulf of Saint Lawrence, over south Fla., and from the middle and south Pacific coasts northeastward over the upper Missouri valley. The precipitation was deficient from the upper lakes southwestward over the southern plateau, on the north Pacific coast, along the west Gulf coast, and in northeast Fla. The greatest excess in precipitation was reported on the south Atlantic coast, where it amounted to 11.35 at Charleston, S. C.; at Key West, Fla., the excess was 9.55; and from Ark. eastward to the south Atlantic coast, in southeast N. Y., and at Charlottetown, P. E. I., it was more than 4.00. The most marked deficiency was noted on the north Pacific coast, and in the lower Rio Grande valley, where it was more than 4.00, and there was a deficiency of more than 2.00 from the northern upper lakes west of south to central Ill., and in northeast Fla.

At the following-named stations the precipitation was the heaviest reported for September during the respective periods of observation. Albany, Palermo, Oswego, and Cooperstown, N. Y., Birdsnest, Va., Charleston, S. C., Augusta and Savannah, Ga., Key West, Fla., Fort Smith and Lead Hill, Ark., Memphis, Tenn., Indianapolis, Ind., North Lewisburgh and Columbus, Ohio, Saint Vincent, Minn., Fort Custer, Mont., Abilene, Tex., San Diego and Sacramento (vol. obs.), Cal.; and at Fort Elliott, Tex., Salt Lake City, Utah, Fort Canby, Neah Bay, Olympia, Fort Townsend, and Tatoosh Island, Wash., and Astoria and Albany, Oregon, it was the least ever reported for September.

Considered by districts, the average percentage of the normal in districts where the precipitation was in excess for September, 1890, was about as follows: New England and the south Atlantic states, 156 per cent.; middle Atlantic states, 155 per cent.; Key West, Fla., 243 per cent.; east Gulf states, 104 per cent.; west Gulf states, 126 per cent.; Ohio Valley and Tennessee, 188 per cent.; lower lake region, 145 per cent.; extreme northwest, 140 per cent.; southeast slope of the Rocky Mountains, 101 per cent.; southern plateau region, 113 per cent. On the middle Pacific coast the average precipitation for September is 0.33, and on the south Pacific coast 0.04, while for the current month the average in these districts was 0.89 and 0.36, respectively. In districts where the precipitation was deficient the percentage of the normal was about as follows: Rio Grande Valley, 15 per cent.; upper lake region, 44 per cent.; upper Mississippi valley, 73 per cent.; Missouri Valley, 70 per cent.; northeast slope of the Rocky Mountains, 64 per cent.; middle-eastern slope of the Rocky Mountains, 30 per cent.; middle plateau region, 50 per cent.; Spokane Falls, Wash., 68 per cent.; north Pacific coast, 9 per cent.

For the period January to September, 1890, inclusive, the precipitation on the middle Pacific coast averaged about $\frac{1}{3}$ greater, and in the west Gulf states, the Ohio Valley and Tennessee, and the lower lake region $\frac{1}{10}$ to $\frac{2}{10}$ greater than the average, while in the Rio Grande Valley, the Missouri Valley, the northeast and the middle-eastern slopes of the Rocky Mountains, and the middle plateau region it averaged $\frac{2}{3}$ to $\frac{3}{4}$ of the normal amount for the period named.

The heaviest precipitation reported for September occurred in central and eastern New York, on the south Atlantic coast, in central Texas, western Arkansas, western Tennessee, in the middle Ohio valley, and at Saint Vincent, Minn., Fort Custer, Mont., and San Diego, Cal., in 1890, when the excess in rainfall was more than 11.00 on the south Atlantic coast; over south New England, southeast New York, and north New Jersey in 1882, when the excess was more than 9.00; from the east part of the lower lake region to the Virginia coast in 1876, when the excess was 2.00 to 3.00; and from the middle Missouri valley to Lake Superior in 1881, when the excess was 5.00 to 8.00. The least precipitation ever noted for September occurred at Salt Lake City, Utah, Fort Elliott, Tex., and on the north Pacific coast in 1890, the deficiency being more than 4.00 on the coast of Washington; along the New England and middle Atlantic coast in 1884, when the deficiency was more than 4.00; on the south Atlantic coast in 1887, when the deficiency exceeded 5.00; on the east Gulf coast in 1883, when the deficiency exceeded 4.00; from the middle Missouri valley to Lake Superior in 1882, when the deficiency exceeded 2.00; and from west Iowa to east Texas in 1888, when the deficiency exceeded 3.00. On the middle and south Pacific coasts and over the southwest part of the southern plateau no rain fell in September for 4 years at Red Bluff, Cal., and Yuma, Ariz., for 5 years at Sacramento, San Francisco, and Los Angeles, Cal., and for 8 years at San Diego, Cal., since the establishment of Signal Service stations at those points. It will be seen that in 1890, when the greatest September rainfall recorded fell in widely-separated areas east of the Rocky Mountains and on the south Pacific coast, the least rainfall noted for September fell on the north Pacific coast, in north Texas, and north Utah. In 1882, when the heaviest rainfall for September fell in south New England, southeast New York, and north New Jersey, the rainfall was the least recorded for that month from the middle Missouri valley to Lake Superior. In 1877, when the heaviest rainfall for North Carolina was recorded, the amount in the lower Rio Grande valley was the least noted for September.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for September for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for September, 1890; (4) the departure of the current month from the average; (5) and the extremes for September during the period of observation and the years of occurrence:

State and station.	County.	(1) Average for the month of Sept.	(2) Length of record.	(3) Total for Sept., 1890.	(4) Departure from average.	(5) Extremes for Sept.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	4.13	9	12.08	+7.95	12.08	1890	0.48	1888
California.									
Sacramento	Sacramento	0.12	41	1.42	+1.30	1.42	1890	0.00	*
Connecticut.									
Middletown	Middlesex	3.38	32	5.97	+2.59	11.64	1882	0.49	1881
Florida.									
Merritt's Island	Brevard	8.04	12	6.41	−1.63	23.78	1878	2.88	1883
Georgia.									
Forsyth	Monroe	3.48	16	5.56	+2.08	8.69	1888	0.10	1886
Illinois.									
Peoria	Peoria	3.51	34	2.12	−1.39	9.63	1875	0.60	1867
Riley	McHenry	3.69	39	0.67	−3.02	8.89	1872	0.21	1877
Indiana.									
Logansport	Cass	3.47	14	3.23	−0.24	6.66	1859	0.24	1882
Vevay	Switzerland	3.45	25	2.81	−0.64	15.25	1866	0.47	1871
Iowa.									
Cresco	Howard	4.16	17	3.21	−0.95	10.03	1881	0.82	1888
Monticello	Jones	4.04	35	4.05	+0.01	10.15	1881	0.00	1871
Logan	Harrison	3.51	24	1.78	−1.73	9.90	1870	0.20	1882
Kansas.									
Lawrence	Douglas	3.36	25	5.62	+1.26	9.15	1884	0.23	1888
Wellington	Sumner	3.80	11	2.86	−0.94	11.19	1881	1.10	1884
Louisiana.									
Grand Coteau	St. Landry	3.61	7	2.97	−0.64	10.58	1885	0.37	1888
Maine.									
Orono	Penobscot	3.36	20	4.47	+1.11	6.97	1888	0.95	1887
Maryland.									
Cumberland	Allegany	2.76	19	6.77	+4.01	8.50	1882	0.40	1873
Massachusetts.									
Amherst	Hampshire	3.39	55	6.08	+2.69	11.85	1882	0.37	1865
Newburyport	Essex	3.18	11	3.39	+0.21	8.47	1888	0.87	1884
Somerset	Bristol	2.94	18	5.19	+2.25	7.27	1888	0.94	1884
Michigan.									
Kalamazoo	Kalamazoo	3.27	14	5.03	+1.76	6.28	1879	0.53	1882
Thornville	Lapeer	2.84	13	2.43	−0.41	5.25	1879	0.95	1882
Minnesota.									
Minneapolis	Hennepin	3.58	24	3.35	−0.23	11.45	1869	0.15	1882
Montana.									
Fort Shaw	Lewis&Clarke	0.81	21	1.40	+0.59	4.79	1882	0.00	'75,'79
New Hampshire.									
Hanover	Grafton	2.99	49	3.99	+1.00	7.03	1840	0.27	1884
New Jersey.									
Moorestown	Burlington	3.82	27	4.57	+0.75	11.71	1882	0.16	1884
South Orange	Essex	4.12	20	4.33	+0.21	14.45	1882	0.15	1884
New York.									
Cooperstown	Otsego	3.25	36	7.24	+3.99	7.24	1890	1.17	1871
Palermo	Oswego	3.19	36	7.55	+4.36	7.55	1890	1.04	1880
North Carolina.									
Lenoir	Caldwell	4.02	18	7.20	+3.18	8.50	1878	0.40	1871
Ohio.									
N. Lewisburgh	Champaign	3.18	18	8.20	+5.02	8.20	1890	0.75	1872
Wauseon	Fulton	2.29	18	3.19	+0.90	5.29	1879	0.55	1871
Oregon.									
Albany	Linn	1.88	12	0.05	−1.83	5.61	1884	0.05	1890
Eola	Polk	1.63	20	0.00	−1.63	6.57	1884	0.00	*
Pennsylvania.									
Dyberry	Wayne	2.78	21	4.40	+1.62	6.49	1888	1.04	1885
Grampian Hills	Clearfield	3.25	19	5.87	+2.62	6.36	1868	1.14	1885
Wellsborough	Tioga	3.47	11	4.39	+0.92	8.40	1880	1.75	1888
South Carolina.									
Statesburgh	Sumter	3.61	9	3.50	−0.11	6.67	1884	0.75	1887
Tennessee.									
Austin	Wilson	3.76	20	6.69	+2.93	10.20	1868	1.51	1884
Texas.									
New Ulm	Austin	5.40	18	6.26	+0.86	15.08	1874	0.90	1872
Vermont.									
Strafford	Orange	3.66	17	3.95	+0.29	6.30	1880	0.70	1884
Virginia.									
Birdsnest	Northampton	3.37	21	9.25	+5.88	9.25	1890	0.00	1884
Washington.									
Fort Townsend	Jefferson	1.31	15	0.15	−1.16	5.79	1874	0.15	1890
Wisconsin.									
Madison	Dane	3.34	20	2.62	−0.72	8.17	1881	0.47	1871

*Frequently.

MAXIMUM RAINFALL IN ONE HOUR OR LESS.

The following table is a record of the heaviest rainfall during September, 1890, for periods of five and ten minutes and one hour, as reported by regular stations of the Signal Service furnished with self-registering gauges:

Station.	Maximum fall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		*Inch.*		*Inch.*	
Bismarck, N. Dak.	0.05	2	0.10	2	0.25	2
Boston, Mass	0.15	12	0.22	16	0.56	16
Buffalo, N. Y.	0.05	19	0.20	6	0.35	6, 16
Cincinnati, Ohio †						
Chicago, Ill	0.11	15	0.16	7	0.34	7
Cleveland, Ohio	0.13	11	0.25	11	0.79	11
Denver, Colo*						
Detroit, Mich.	0.20	4	0.35	4	0.42	4
Dodge City, Kans	0.05	4	0.05	4	0.15	4
Duluth, Minn	0.25	3	0.32	3	0.44	3
Galveston, Tex.	0.25	22	0.45	22	0.68	22
Jupiter, Fla	0.30	5	0.32	5	0.80	20
Marquette, Mich	0.15	2	0.25	2	0.25	2
Memphis, Tenn.	0.20	15	0.45	15	0.65	22
New York City	0.35	17	0.50	17	1.55	17
New Orleans, La.	0.26	10	0.47	10	1.05	10
Norfolk, Va.	0.32	14	0.50	14	1.30	14
Philadelphia, Pa	0.10	6	0.19	6	0.39	6
Portland, Oregon*						
Saint Louis, Mo	0.10	5	0.12	5	0.16	7
Saint Paul, Minn	0.09	17	0.18	17	0.31	17
San Diego, Cal.	*		0.02	29	0.10	29
San Francisco, Cal	0.06	29	0.09	29	0.20	29
Santa Fé, N. Mex†						
Savannah, Ga	0.35	12, 24	0.55	24	1.65	24
Washington City	0.30	11	0.45	11	0.90	11
Wilmington, N. C.	0.25	25	0.45	25	1.45	25

*Not sufficient to register. †Rain-gauge not working.

EXCESSIVE PRECIPITATION.

Precipitation to equal or exceed 10.00 was reported at 6 stations in Fla., at 5 stations in Ga. and S. C., at 4 stations in Mass., at 3 stations in Ark., at 2 stations in Miss. and Tex., and at 1 station in Ala., La., Mo., N. Y., and Ohio; the heaviest monthly precipitation, 21.15, being reported at Homeland, Fla.

In September of preceding years precipitation to equal or exceed 10.00 has been reported for 30 years in Fla.; for 16 years in Tex.; for 11 years in N. C.; for 10 years in Ga. and Iowa; for 5 to 9 years in Ala., Ill., Ind., Kans., La., Md., Mass., Miss., Nebr., N. H., N. J., N. Y., Pa., S. C., and Va.; and for 1 to 4 years in Ariz., Conn., Del., D. C., Ind. T., Ky., Mich., Minn., Mo., Ohio, Oregon, Tenn., Vt., Wash., and Wis. In states and territories other than those named precipitation to equal or exceed 10.00 has not been reported for September of preceding years. Among the heavier rainfalls reported for September are: 23.78, at Merritt's Island, Fla., 25.10, at Biscayne, Fla., and 21.12, at Jacksonville, Fla., in 1878; 22.10, at Fort Myers, Fla., in 1854; 23.90, at Saint Augustine, Fla., in 1871; 23.24, at Mayport, Fla., in 1885; 22.08, at Brunswick City, Ga., and 27.41, at Saint Mary's, Ga., in 1885; 25.98, at Paterson, N. J., in 1882; 21.97, at Sing Sing, N. Y., in 1868; 26.50, at Elsworth, N. C., in 1881; 20.10, at Wilmington, N. C., in 1877; 20.44, at Spartanburgh, S. C., in 1888; 30.57, at Brownsville, Tex., in 1886; and 26.01, at Galveston, Tex., in 1885. Exclusive of the instances and years cited precipitation to equal or exceed 15.00 in September has been reported for 5 years in Tex.; for 3 years in La.; for 2 years in Ind., N. H., and N. C.; and for one year in Del., Fla., Ga., Ind. T., Iowa, Minn., N. Y., Ohio, Oregon, S. C., and Va.

Precipitation to equal or exceed 2.50 in 24 hours was reported at 25 stations in N. Y., and on 8 dates, the 6th, 9th, 10th to 13th, 16th, and 17th; at 17 stations in Tex., and on 8 dates, the 6th to 11th, 15th, and 21st; at 9 stations in Ga., and on 10 dates, the 2–3d, 9th, 12–13th, 21st, 24th, 25th, 28th, and 29th; at 9 stations in Miss., and on 6 dates, the 10th, 20th to 22d, and 23d–24th; at 7 stations in Mo., and on 6 dates, the 2d, 7–8th, 9th, and 23d–24th; at 7 stations in Tenn., and on 4 dates, the 21st to 24th; at 23 stations in Ohio, and on 8 dates, the 5th, 6th, and 8th to 13th; at 5 stations in Fla., and on 5 dates, the 1st, 21st, 22d, 29–30th; at 5 stations in Mass., and on 5 dates, the 6th, 7th, 13th, 16th, and 17th; at 5 stations in N. C., and on 4 dates, the 9th, 14th, 15th, and 25th; at 4 stations in Ark., and on 5 dates, the 8th, 13th, 22–23d, and 24th; at 4 stations in Ill., and on 3 dates, the 7th, 9th, and 10th; at 4 stations in Ind., and on 4 dates, the 5th, 10–11th, and 18th; at 4 stations in Ind., and on 3 dates, the 7th, 17th, and 22d; at 4 stations

in S. C., and on 7 dates, the 2d, 13th, 14th, 15th, 24-25th, and 27th; at 3 stations in N. H., and on 6 dates, the 12-13th, 16-17th, and 18th; at 2 stations in Ala., and on 4 dates, the 5-6th, and 23d-24th; at 2 stations in Me., on the 17-18th; at 2 stations in Va., and on 3 dates, the 14th, and 27-28th; at 2 stations in W. Va., and on 4 dates, the 5-6th, and 11-12th; at 1 station in Conn., on the 17th; at 1 station in Minn., on the 2-3d; at 1 station in Nebr., on the 18th; at 1 station in N. J., on the 17th; at 1 station in S. Dak., on the 5-6th; and at 1 station in Wis., on the 3d. Among the heavier rainfalls reported for this period are: 6.85 at Homeland, Fla., 1st; 6.50 at Milledgeville, Ga., 28th; 6.48 at South Canisteo, N. Y., 10th; 6.47 at Columbia, Tex., 10-11th; 6.45 at Hot Springs, Ark., 22-23d; 5.72 at Minden, La., on the 22d; 5.42 at Charleston, S. C., 24-25th; 5.34 at Wedgwood, N. Y., 10th; 5.27 at New Braunfels, Tex., 8th; 5.20 at Centreville, Mo., 8-9th; and 5.20 at Brewer Mine, S. C., 13-14th.

In September of preceding years precipitation to equal or exceed 2.50 in 24 hours has been reported for 19 years in Tex.; for 18 years in N. C.; for 15 years in Fla.; for 14 years in Ga., Kans., Miss., and S. C.; for 13 years in Mo.; for 12 years in Ill., Iowa, and Ohio; for 11 years in Ala., Mich., Pa., Tenn., and Va.; for 10 years in N. J.; for 5 to 9 years in Ark., Conn., the Dakotas, Ind., Ind. T., Ky., La., Md., Minn., Nebr., N. Y., and Wis.; and for 1 to 4 years in Cal., Colo., Del., D. C., Me., Mass., Mont., N. H., N. Mex., Oregon, R. I., Vt., and W. Va. In states and territories other than those named precipitation to equal or exceed 2.50 in 24 hours has not been reported for September of preceding years. Among the heavier rainfalls reported for 24 hours in September of preceding years are: 7.00, at Mobile, Ala., 18th, 1877; 10.70, Fort Delaware, Del., 3d-4th, 1888; 9.52, Mayport, Fla., 21st, 1885; 7.90, Key West, Fla., 21st-22d, 1889; 9.09, Merritt's Island, Fla., 9th, 1878; 7.04, Merritt's Island, Fla., 10th, 1878; 7.82, Jesup, Ga., 27th, 1885; 8.22, Nashua, Iowa, 25th, 1880; 7.00, Fort Hays, Kans., 12th, 1871; 7.52, Sedan, Kans., 10-11th, 1889; 7.00, Shreveport, La., 17th, 1875; 7.50, South Fork, Ky., 17-18th, 1889; 10.60, Genoa, Nebr., 1st, 1887; 7.41, Mount Washington, N. H., 15th, 1880; 8.00, Lambertville, N. J., 2d, 1850; 7.50, South Orange, N. J., 23d, 1882; 13.00, Elsworth, N. C., 15-16th, 1881; 7.00, Portsmouth, N. C., 12th, 1884; 7.30, Wilmington, N. C., 10th, 1880; 7.40, Abbeville, S. C., 10th, 1888; 8.35, Greenwood, S. C., 10th, 1888; 8.50, Brownsville, Tex., 21st, 1887; 7.02, Wytheville, Va., 12th, 1878. Exclusive of the instances and years cited precipitation to equal or exceed 5.00 in 24 hours has been reported for 7 years in Tex.; for 6 years in N. C.; for 4 years in Fla. and Ga.; for 2 years in La. and Miss.; and for one year in Ala., Ark., Iowa, Kans., Mass., Mo., Ohio, Pa., and Wis.

Precipitation to equal or exceed 1.00 in one hour was reported at 7 stations in Tex., and on 5 dates, the 7th to 9th, and 13th and 15th; at 5 stations in Fla., and on 4 dates, the 1st, 12th, 16th, and 27th; at 5 stations in Ga., and on 8 dates, the 2d, 14th, 16th, 20th, 21st, 24th, 26th, and 27th; at 5 stations in Tenn., and on 5 dates, the 8th, 21st, 22d, 24th, and 25th; at 4 stations in Ala., and on 6 dates, the 5th, 6th, 10th, 23d, 24th, and 30th; at 4 stations in N. C., and on 4 dates, the 8th, 21st, 25th, and 27th; at 3 stations in Kans. on the 18th; at 3 stations in Ohio, and on 2 dates, the 5th and 8th; at 2 stations in Ind., and on 2 dates, the 5th and 18th; at 2 stations in La., and on 2 dates, the 10th and 22d; at 2 stations in Miss., and on 2 dates, the 4th and 23d; at 2 stations in N. Y., and on 2 dates, the 13th and 17th; at 2 stations in S. C., and on 2 dates, the 8th and 14th; at 2 stations in Va., and on 2 dates, the 7th and 14th; at 1 station in Ark. on the 12th; at 1 station in Ill. on the 7th; at 1 station in Ky. on the 26th; at 1 station in Minn. on the 3d; at 1 station in Nebr. on the 18th; and at 1 station in W. Va. on the 7th. Among the heavier rainfalls reported for 1 hour or less are: 2.00 in 5 minutes at Demos, Ohio, 5th; 0.35 in 5 minutes at New York City, 17th; 0.30 in 5 minutes at Jupiter, Fla., 5th; 0.35 in 5 minutes at Savannah, Ga., 12th and 24th; 0.30 in 5 minutes at Washington City, 11th; 1.10 in 10 minutes at Pine Apple, Ala., 5th; 1.50 in 10 minutes at Kirkwood, S. C., 14th; 1.62 in 30 minutes at Selma (2), Ala., 30th; and 4.12 in 45 minutes at Monroe, La., 22d.

In September of preceding years precipitation to equal or exceed 1.00 in one hour has been reported for 13 years in Tex.; for 11 years in Fla.; for 5 to 9 years in Ga., Ill., Kans., Mo., Nebr., and N. C.; and for one to 4 years in Ala., Ariz., Ark., the Dakotas, D. C., Ind., Ind. T., Iowa, Ky., La., Md., Mass., Mich., Minn., Miss., N. H., N. J., N. Y., Ohio, Pa., S. C., Tenn., Vt., Va., W. Va., and Wis. In states and territories other than those named precipitation to equal or exceed 1.00 in one hour has not been reported for September in preceding years. Among the heavier rainfalls reported for one hour or less in September of preceding years are: For 8 minutes, 0.45, at New York City, 21st, 1882. For 11 minutes, 1.05, Alpena, Mich., 10th, 1884. For 15 minutes, 1.00, Omaha, Nebr., 28th, 1881. For 20 minutes, 1.07, Fort Riley, Kans., 15th, 1870; 3.00, Howe, Tex., 10th, 1889. For 25 minutes, 1.23, Washington City, 16th, 1888; 1.20, Philadelphia, Pa., 21st. 1882; 1.27, Indianola, Tex., 7th, 1880. For 27 minutes, 1.45, Cairo, Ill., 13th, 1871. For 30 minutes, 1.70, Cedar Keys, Fla., 2d, 1888; 1.40, Mount Sterling, Ill., 1st, 1886; 2.00, Charleston, S. C., 13th, 1877. For 35 minutes, 1.64, Fort Barrancas, Fla., 23d, 1878; 1.93, Rio Grande City, Tex., 26th, 1879. For 45 minutes 2.42, Fort Davis, Tex., 9th, 1880.

Table of excessive precipitation, September, 1890.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Double Springs		3.41	23-24			
Marion				1.22	1 10	10
Montgomery				1.42	1 00	6
Do				2.05	1 00	24
Pine Apple				1.10	0 10	5
Do				1.20	0 50	10
Do				1.98	1 00	23
Selma (2)				1.62	0 30	30
Valley Head	10.07	3.17	5-6			
Do		4.60	24			
Alaska.						
Juneau	17.11					
Killisnoo	12.80					
Arkansas.						
Conway	10.31					
Forrest City				1.40	1 00	12
Fulton		2.90	13			
Helena (1)		4.02	24			
Hot Springs	12.62	6.45	22-23			
Lead Hill	12.08	2.60	8			
Do		5.46	22-23			
Connecticut.						
New Hartford		2.61	17			
Florida.						
Alva	10.19			2.04	1 00	12
Fort Meade	14.83	3.00	1			
Homeland	21.15	6.85	1	1.50	1 30	16
Do		2.80	22			
Hypoluxo	14.93	2.55	21	1.91	1 30	16
Key West	16.14	2.53	29-30			
Madison	12.34					
Merritt's Island				1.50	0 40	27
Pensacola		2.84	1	2.03	1 00	1
Georgia.						
Atlanta				1.15	0 37	21
Augusta				1.50	1 00	14
Diamond	19.55	5.30	12-13	2.10	1 00	16
Do				2.00	2 00	20
Fort McPherson		2.52	21			
Milledgeville	12.95	6.50	28			
Monticello		3.26	24-25			
Point Peter		4.30	28-29			
Poulan	13.16			1.60	1 30	26
Do				1.75	1 00	27
Quitman (2)		2.50	9			
Savannah	16.58	4.69	2-3	1.00	1 00	2
Do		4.85	24-25	1.65	1 00	24
Toccoa		4.00	29			
Union Point		2.70	29			
Washington	10.67					
Illinois.						
Golconda		2.65	9-10			
Jordan's Grove		2.56	9			
Palestine		4.12	9-10			
Pana		2.75	7	2.75	2 00	7
Indiana.						
Angola		3.94	5			
Farmland		4.00	5	4.00	2 50	5
Indianapolis		3.25	10-11			

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Iowa.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Clarinda				1.70	0 50	18
Eagle Grove		2.50	18			
Kansas.						
Emporia				2.13	2 00	18
Leavenworth				1.39	1 00	18
Wakefield				2.27	0 50	18
Kentucky.						
Princeton				2.10	1 15	26
Louisiana.						
Houma		2.69	17			
Lake Charles		3.20	7			
Minden	10.63	5.72	22			
Monroe		4.12	22	4.12	0 45	22
New Orleans				1.05	1 00	10
Maine.						
Bar Harbor		3.13	17–18			
Cornish		4.19	17–18			
Massachusetts.						
Blue Hill (summit)		2.92	6			
Chicopee	11.14					
Milton		2.82	6–7			
Northampton		2.64	17			
Provincetown		3.00	16			
Royalston	10.38	2.50	13			
Springfield Armory	11.14					
Minnesota.						
Fergus Falls		2.60	2–3			
Fort Ripley				1.02	1 00	3
Mississippi.						
Booneville		2.70	21			
Columbus (2)		3.20	10			
Do		2.96	20			
Corinth	12.57	3.30	20			
Do		3.65	23–24			
Holly Springs		2.83	22–23			
Meridian				1.17	0 43	4
Moss Point		3.50	22			
Okolona	10.26	3.00	20			
Do		4.09	21–22			
Palo Alto		2.93	24			
Pontotoc		2.90	24			
Rienzi		2.79	22	1.33	1 00	23
Missouri.						
Brunswick		2.50	2			
Centreville		5.20	8–9			
Glasgow		2.67	2			
Ironton		3.75	8–9			
Sarcoxie	14.41	2.90	8			
Do		4.31	23–24			
Springfield		2.72	7–8			
Willow Springs		2.53	8			
Nebraska.						
Genoa		3.13	18			
Omaha				1.13	1 00	18
New Hampshire.						
Lake Village		3.44	16–17			
Mount Washington		3.57	12–13			
North Conway		2.63	17–18			
New Jersey.						
Freehold		3.50	17			
New York.						
Addison		3.04	10			
Alabama		2.59	10			
Albany		3.27	9–10			
Alfred Centre		4.34	10			
Angelica		2.74	9–10			
Baldwinsville		2.52	11			
Canton		3.40	11–12			
Carmel		4.46	13			
Cooperstown		3.00	10			
Hyndsville		3.50	10			
Ithaca		3.00	9–10			
Lowville		3.00	13			
New Lisbon		3.12	10			
New York City		5.12	16–17	1.50	1 00	17
Number Four		4.32	12–13			
Oswego		2.92	10–11			
Oxford		3.04	10			
Palermo		2.90	13	2.90	2 00	13
Palmyra		3.33	6			
Perry City		3.51	10			
Quaker Street		3.35	10			
Rome		3.48	11			
South Canisteo	12.72	6.48	10			
South Kortright		2.87	12–13			
Wedgwood		5.34	10			
North Carolina.						
Chapel Hill		2.60	14			
Hatteras				1.40	0 30	21
Highlands		3.90	9			
Lenoir				2.20	1 30	27
Mount Airy		3.00	14			
New Berne				1.88	1 30	8
Wadesborough		2.50	15			
Wilmington		3.54	25	1.45	1 00	25
Ohio.						
Akron		3.05	10–11			
Dayton		3.79	5–6			
Demos				2.00	0 05	5
Granville		2.98	5–6			
Gratiot		3.46	5–6			

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Ohio—Continued.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Logan		2.50	8			
Lordstown		2.77	11			
Marietta (2)		3.22	5–6			
Do		3.14	11–12			
McConnelsville		3.06	6			
North Lewisburgh		2.70	4–5	2.30	1 30	5
Ohio State University		2.50	5–6			
Shiloh		2.55	11			
Westerville		3.30	5			
West Milton	10.20	3.25	5	2.25	1 30	8
Vienna		2.50	17			
Youngstown		2.63	11			
Zanesville		4.00	5–6			
Pennsylvania.						
Corry		2.50	9–10			
Franklin		2.50	12			
Meadville (2)		3.23	11–12			
Myerstown		2.71	11–12			
Wellsborough		2.94	9–10			
York		2.95	12–13			
South Carolina.						
Brewer Mine		5.20	13–14			
Charleston	11.89	5.42	24–25			
Hardeeville	11.03					
Jacksonborough	10.04					
Kirkwood				1.50	0 10	14
Port Royal	13.68	2.63	2			
Saint Georges	12.03	2.50	14–15	1.40	1 00	8
Do		4.00	27			
South Dakota.						
Sioux Falls		2.80	5–6			
Tennessee.						
Arlington		4.25	21–22	1.65	1 30	21
Do		2.50	23–24			
Bolivar (2)		4.60	24			
Grand Junction		4.73	24			
Hohenwald		2.83	24			
Kingston Springs		2.80	21			
Lewisburgh		2.79	22			
Lynnville				1.95	1 00	22
Memphis		4.50	23–24	1.35	0 35	24
Rugby				1.35	1 00	8
Trenton				1.37	0 30	25
Texas.						
Abilene		4.42	7–8	1.30	1 00	7
Brenham				1.38	1 00	13
Camp del Rio		4.00	11			
Colorado		2.80	6–7			
College Station		3.40	8			
Columbia	10.01	6.47	10–11			
Cuero		3.00	15	3.60	2 40	15
Forestburgh		3.13	21			
Fort Worth		2.52	8			
Galveston		2.62	7			
Grapevine		2.75	21			
La Grange	10.02	3.13	7			
Do		3.82	13	3.82	2 00	13
Mesquite		2.84	21			
Mountain Springs		3.55	21			
New Braunfels		5.27	8	5.27	2 20	8
New Ulm		3.58	7–8			
Palestine				1.53	0 43	15
San Antonio		4.71	8–9			
Do		3.00	9	3.00	1 .5	9
Virginia.						
Birdsnest		3.35	27–28			
Cape Henry		2.82	14			
Fort Monroe				1.08	1 00	7
Norfolk				1.30	1 00	14
West Virginia.						
Glenville		3.50	5–6			
Parkersburgh		2.71	11–12	1.05	1 00	7
Wisconsin.						
Medford		3.10	3			

Received too late to be used in general discussion for September, 1890.

Arizona.						
Wood Cañon		3.50	9			

SNOW (in inches and tenths).

The first snow of the season was reported in the mountains near Rapid City, S. Dak., and at Helena, Mont., on the 5th; at Fort Washakie, Wyo., on the 6th; at Fort Assiniboine and Fort Custer, Mont., on the 11th; at Saint Vincent and Moorhead, Minn., and Fort Yates, N. Dak., on the 12th; and at Marquette, Mich., and Milwaukee, Wis., on the 13th. The snow melted as it fell. The observer at Eagle Pass, Ariz., reports that 6.00 fell on the east side of Mount Graham (about 6,000 feet) on the 23d, and that the snow had disappeared on the 24th. The reports of United States Army post surgeons

and voluntary observers show that the first snow of the season fell at Choteau and Fort Logan, Mont., on the 5th; at Camp Sheridan, Wyo., on the 6th; at Fort Shaw and Camp Poplar River, Mont., and Napoleon and New England City, N. Dak., on the 11th; at Fort Pembina and Wild Rice, N. Dak., Webster, S. Dak., Fergus Falls, Minn., and Butternut, Wis., on the 12th; at Steele, N. Dak., on the 13th; and at Tyler's Creek, W. Va., on the 28th. Snow fell at Mount Washington, N. H., on the 23d, 24th, and 28th.

Monthly snowfall was reported as follows: *Arizona.*—Fort Huachuca, trace. *Colorado.*—Climax, 8.2; Breckenridge, 5.0. *Idaho.*—Henry's Lake, 0.1. *Montana.*—Blackfeet Agency, 17.0; Choteau, 6.0; Fort Logan, 2.0; Fort Custer, 0.5; Fort Shaw, trace. *North Dakota.*—Fort Pembina, New England City, and Steele, 2.0; Davenport and Gallatin, 0.5; Fort Yates, trace. *South Dakota.*—Webster, 0.2. *West Virgina.*—Tyler's Creek, 0.2. *Wyoming.*—Camp Sheridan and Fort Washakie, trace.

HAIL.

Description of the more severe hail storms of the month is given under "Local storms." Hail was reported as follows: 1st, Iowa, Mont. 2d, Colo., Ind. T., Wash. 3d, Ariz., Colo., N. Dak. 5th, Minn., Nebr., N. Mex., N. Y., Ohio. 6th, Ariz., Iowa, Kans., Nebr. 7th, Ariz. 8th, S. C. 9th, Kans. 10th, S. Dak. 11th, Nebr., N. Dak., S. Dak. 12th, Iowa, Kans., Minn., S. Dak. 13th, N. Mex. 14th, Kans., La., Tex. 15th, Mich. 16th, Mich., N. Y., Pa. 18th, Iowa, Kans., Mich., Mo. 19th, Kans., Mich., Tenn. 20th, Colo. 21st, Colo. 22d, Ariz. 23d, N. Y., Vt. 24th, Colo. 25th, Kans. 26th, Cal., Colo., Ind. T. 28th, Ga. 30th, Ariz., Wash.

SLEET.

Sleet was reported at Moorhead, Minn., Flandreau and Huron, S. Dak., on the 12th; in Minn. on the 13th and 14th, and in Colo. on the 28th.

WINDS.

The prevailing winds during September, 1890, are shown on chart II by arrows flying with the wind. In New England the winds were mostly from southwest to northwest; in Virginia and the south Atlantic states, northeast; over the Florida Peninsula, south to east; in the east Gulf states, north to east; in the west Gulf states, northeast to southeast; in the Ohio Valley and Tennessee, northeast, except in the upper Ohio valley, southerly; in the lower lake region and on the northeast slope of the Rocky Mountains, southeast to southwest; in the upper Mississippi valley, northwest to northeast; in the Missouri Valley, southerly; over the southern plateau, south to west; over the northern plateau, south to southwest; on the middle and south Pacific coasts, west to northwest; and in the middle Atlantic states, the upper lake region, the extreme northwest, on the middle-eastern and southeast slopes of the Rocky Mountains, over the middle plateau region, and on the north Pacific coast, variable.

HIGH WINDS (in miles per hour).

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Signal Service, as follows: 6th, 50, nw., at Fort McKinney, Wyo. 29th, 63, ne., at Kitty Hawk, N. C. 30th, 69, nw., at Mount Washington, N. H.

LOCAL STORMS.

1st.—A severe hail storm occurred at Bancroft, Iowa. In Seneca township, west of Bancroft, the hail drifted to a depth of 18 inches. During a heavy thunder-storm lightning struck a barn near Alta, Iowa; loss $1,000. A very heavy rain storm in the afternoon flooded streets in Ashland, Wis. 5th.—A heavy thunder-storm passed over Long Island in the evening and some damage was caused by lightning. Heavy rain in Ritchie Co., W. Va., flooded small streams. Severe thunderstorms occurred in central and south-central Illinois in the evening, and 2 persons who had sought shelter under trees were reported killed by lightning. During a thunder-storm at Alta, Iowa, lightning struck a drug store, setting it on fire, and damaging the building and stock to the extent of about $2,500. Lightning also struck another house in Alta, stunning the inmates. During a thunder-storm at Canton, S. Dak., lightning struck a barn near that place, which, with its contents, 62 tons of hay, was burned. A heavy hail storm in the evening caused considerable damage at Devil's Lake, N. Dak. 6th.—A severe storm moved eastward over Jackson Co., W. Va., about 5 p. m., local time, destroying several buildings and damaging other property.

7th.—A thunder-storm, with heavy rain, visited Parkersburgh, W. Va., in the morning; many cellars were flooded; in the country small streams overflowed their banks, and the Ohio and Kanawha rivers were rising rapidly as the result of heavy rain in that section. During a heavy thunder-storm a barn near Wauseon, Ohio, was struck by lightning and burned. A heavy wind and rain storm in the afternoon caused considerable damage in Paxton, Ill., and vicinity. A heavy rain storm, with thunder, commenced at Abilene, Tex., at 7 p. m., eastern time. The storm was attended by high wind; 3.90 inches of rain fell in 13 hours, flooding cellars, etc. 8th.—About noon lightning struck a building in Altoona, Pa., occupied by the Pennsylvania R. R. Co.; the building was set on fire, causing a heavy loss. Lightning also struck another house in Altoona, injuring several persons. An unusually heavy rain storm was reported at Bucyrus, Ohio. 9th.—A storm, causing considerable damage, was reported near Goshen, Ind. 9–10th.—At South Canisteo, N. Y., an excessive rainfall of 6.48 inches in 24 hours occurred, destroying crops and washing away bridges. The heavy rain also caused floods in Schuyler and Chemung counties, N. Y., resulting in washouts and landslides on railroads, washing away of bridges, etc. 10th.—A cloud burst was reported about 15 miles from Del Rio, Tex., in the evening; the volume of water caused a washout on the Southern Pacific Railroad in which a passenger train was wrecked. Considerable damage was also reported near Eagle Pass, Tex., by the sudden rise and overflow of a mountain stream, the Rio Escondido. 11th.—About 8 p. m. a severe electrical storm passed over Ellicott City, Md. A thunder-storm, with heavy rain, caused some damage at York, Pa. Heavy rain had swelled the streams and caused great damage to railroad and other property in Chemung, Steuben, Onondaga, Allegany, Tomkins, and Livingston counties, N. Y. Heavy rain caused much damage in northern Ohio; streams were unusually high, and great destruction was reported throughout Summit county. 12th.—Heavy rain continued in western and central New York. The Black River was swelled to nearly the height of the usual spring freshet. The Genesee River was rising rapidly. At Ilion, N. Y., the Mohawk River was over its banks and flats were covered with water. At Syracuse the water in Onondaga Lake rose rapidly, and the grounds of the New York State Fair were flooded. Heavy rain caused heavy losses by flood and landslides in northern West Virginia. A violent wind and rain storm caused considerable damage in Jackson and Independence counties, Ark., in the afternoon.

13th.—A heavy thunder and rain storm occurred at night in Carroll Co., Md.; bridges were washed away, lowlands flooded, and crops destroyed. Floods, resulting from heavy rain, continued in central and western New York. Damage to the extent of many thousands of dollars was done in the north and west parts of Lewis county, where mills, dams, bridges, and houses were swept away. Damaging floods were

Precipitation. September; 1890.